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Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 to 21 (cancelled).

Claim 22 (new): A control system for a device (29), wherein a graphic user interface ("GUI") controller (40) frees an embedded controller (42a; 42b; 42d) from handling a GUI (88A) of the device, the control system comprising:

the embedded controller (42a; 42b; 42d) for controlling and monitoring the device;

a liquid crystal display ("LCD") (20) for displaying the GUI to a user, the GUI including:

a first GUI object for displaying a status of the device; and

a second GUI object for displaying a command to the device;

a touch screen (14) for detecting the command from the user;

the GUI controller (40), comprising:

at least one memory (70, 72), comprising:

a document buffer (64) storing a document (µHTML) defining an appearance of the GUI, the document comprising:

a first operation code ("opcode") identifying the first GUI object;

a second opcode identifying the source of the status;

a third opcode identifying the second GUI object; and

a fourth opcode identifying the destination of the command;

a data buffer (78, 96, 98) storing the status and th command;

a GUI object library (84) storing:

Key

-2-   S rial N . 09/692,997

DRAFT

a first set of executable codes for rendering the first GUI object, receiving the status from the embedded processor, and further rendering the first GUI object to show a visual response to the status;

a second set of executable codes for rendering the second GUI object, receiving the command from the touch screen, further rendering the second GUI object to show a visual response to the command, and sending the command to the embedded processor;

a frame buffer (30) storing at least one complete display frame image of the GUI;

a processor (68) for rendering the GUI and handling user inputs, wherein:

the processor is coupled to the touch screen via a touch screen analog to digital converter (62) to receive the command;

the processor is coupled to the embedded processor via a serial UART interface (58; 58') to send the command and to receive the status;

the processor is coupled to the at least one memory via a direct memory bus interface, wherein:

in response to the first and the second opcodes, the GUI processor executes the first set of executable codes to render the first GUI object to the frame buffer (30), to communicate with the embedded processor to receive the status from the embedded processor, and to further render the first GUI object to the frame buffer (30) in response to the status;

in response to the third and the fourth opcodes, the GUI processor executes the second set of executable codes to render the second GUI object to the frame buffer (30), to receive the command from the touch screen, to render the second GUI object again to the frame buffer (30) to show a

-3-   Serial No. 09/692,997

DRAFT

visual response to the command, and to send the command
to the embedded processor;

a pixel serializer (36) coupled to the LCD to continuously refresh
the LCD with the complete display frame image in the frame buffer
that contains both the rendered first GUI object and the rendered
second GUI object.

Claim 23 (new): A first controller (40) providing a graphical user interface ("GUI") (88A) for a
device (29) that is monitored and controlled by a second controller (42a; 42d), the first controller
comprising:

at least one memory (70, 72) comprising:

a document buffer (64) storing a document, the document comprising an
operation code ("opcode") identifying a GUI object in the GUI and a
second opcode identifying a parameter of the GUI object, the parameter
being from a source (14; 42a; 42b; 42d) external to the first controller;

a frame buffer (30) for storing at least one complete frame of the GUI
including a visual representation of the GUI object;

a GUI object library storing executable codes (84, 88, 90) for
communicating the parameter with the source and rendering the GUI object
in response to the parameter;

a processor (68) coupled to the at least one memory, wherein the processor reads
the first and the second opcodes, reads the executable codes, executes the
executable codes to communicate the parameter with the source and to render the
GUI object in response to the parameter, and saves the rendered GUI object in the
frame buffer.

Claim 24 (new): The first controller of claim 23, further comprising an output device (20) coupled
to the frame buffer to receive the GUI, the output device displaying the GUI to the user.

Claim 25 (new): The first controller of claim 24, wherein the output device is a liquid crystal
display ("LCD").

DRAFT

Claim 26 (new): The first controller of claim 25, further comprising a pixel serializer (36) coupled between the frame buffer and the LCD, the pixel serializer outputting each line of the GUI in the frame buffer to the LCD.

Claim 27 (new): The first controller of claim 23, wherein the source external to the first controller is an input device (14), the parameter is a command from the user to the second controller for controlling the device, and the processor communicates the parameter with the source by receiving the command from the input device.

Claim 28 (new): The first controller of claim 27, wherein the executable codes further comprises the instructions for the processor to send the command to the second controller, the method further comprising the processor sending the command to the second controller.

Claim 29 (new): The first controller of claim 28, wherein the input device is one of a touch screen, a key pad, an infrared remote, and a voice decoder.

Claim 30 (new): The first controller of claim 29, wherein the GUI object is one of a button and a list.

Claim 31 (new): The first controller of claim 23, wherein the source external to the first controller is the second controller (42a; 42d), the parameter is a status of the device from the second controller to the user, and the processor communicates the parameter with the source by receiving the status from the second controller.

Claim 32 (new): The first controller of claim 31, wherein the GUI object is a text field.

Claim 33 (new): The first controller of claim 23, further comprising another memory (42c; 42d) coupled to the processor, the another memory storing the document, the processor buffering the document from the another memory to the at least one memory.

Claim 34 (new): The first controller of claim 23, wherein the second controller (42d) further comprises another memory storing the document, the second controller reading the document from the another memory and sending the document to the first controller, the first controller storing the document in the at least one memory.

Claim 35 (new): A method for a first controller (40) to generate a graphic user interface ("GUI") (88A) for a device (29) that is monitored and controlled by a second controller (42a; 42d), comprising:

DRAFT

writing a document in a document buffer in at least one memory (70, 72), wherein the document defines an appearance f the GUI, the document comprising a first operation code ("opcode") identifying a GUI object and a second opcode identifying a parameter of the GUI object, the parameter being from a source (14; 42a; 42b; 42d) external to the first controller;

in response to the first and the second opcodes, retrieving executable codes (84, 88, 90) of the GUI object from a GUI object library (84) stored in the at least one memory (70, 72), wherein the executable codes comprises instructions for communicating the parameter with the source and rendering the GUI object in response to the parameter;

executing the instructions to communicate the parameter with the source and to render the GUI object in response to the parameter;

writing the rendered GUI object in a frame buffer in the at least one memory; and

sending the rendered GUI object from the frame buffer to an output device (22), wherein the output device displays the GUI to a user.

Claim 36 (new): The method of claim 35, wherein the output device is a liquid crystal display ("LCD").

Claim 37 (new): The method of claim 35, wherein the source external to the first controller is an input device (14), the parameter is a command from the user to the second controller for controlling the device, and the processor communicates the parameter with the source by receiving the command from the input device.

Claim 38 (new): The method of claim 37, wherein the executable codes further comprises the instructions for the first controller to send the command to the second controller, the method further comprising the first controller sending the command to the second controller.

Claim 39 (new): The method of claim 38, wherein the input device is one of a touch screen, a key pad, an infrared remote, and a voice decoder.

Claim 40 (new): The method of claim 39, wherein said rendering the GUI object comprises drawing one of a button and a list.

Claim 41 (new): The method of claim 35, wherein the source external to the first controller is the second controller (42a; 42d), the parameter is a status f the device from the second controller to

-6-   Serial No. 09/692,997

DRAFT

the user, and the processor communicates the parameter with the source by receiving the status from the second controller.

Claim 42 (new): The method of claim 41, wherein said rendering the GUI object comprises drawing a text field.

Claim 43 (new): The method of claim 35, further comprising reading the document from another memory (42c) and buffering the document in the at least one memory.

Claim 44 (new): The method of claim 35, further comprising receiving the document from the second controller and buffering the document in the at least one memory.

Claim 45 (new): A method for programming a graphic user interface ("GUI") (88A) for a GUI controller of a device (29), comprising:

> creating a HTML page (86) defining an appearance of the GUI, said creating comprising:

>> writing an applet code for a GUI object;

>> writing a reference to a source of a parameter of the GUI object;

> compiling the HTML page into a compact HTML page, said compiling comprising

>> replacing the applet code with a first operation code ("opcode") identifying the GUI object;

>> replacing the reference with a second opcode identifying the parameter of the GUI object;

> reading the compact HTML page from at least one memory (70, 72) in the device; and

> in response to the first and the second opcodes, executing executable codes instructions in the at least one memory to communicate the parameter with the source and to render the GUI object in response to the parameter.

Claim 46 (new): The method of claim 45, wherein said communicating the parameter with the source comprises receiving a status f the device from an embedded controller, the embedded controller monitoring and controlling the device.

Serial No. 09/692,997

DRAFT

Claim 47 (new): The method of claim 45, wherein said communicating the parameter with the source comprises receiving a command from an input device (14).

Claim 48 (new): The method of claim 47, further comprising executing the executable codes to send the command to the embedded controller.

Serial No. 09/692,997